

**ENVIRONMENTAL MANAGEMENT AUDIT
HOTEL**

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Prepared for:

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Executive Summary

What is an environmental management system?

- < An environmental management system (EMS) is a management tool through which a property can evaluate and improve its environmental performance and establish, achieve and sustain its environmental performance objectives.

Why should Hotel X develop an EMS?

- < An EMS will help Hotel X sustain the social and physical environment on which it depends for its survival. Tourists visit City X to savor the beauty of its nature and to experience the warmth and kindness of its people. The day City X loses these valuable attributes will mark the end of its tourism industry.
- < Hotel guests are increasingly taking interest in the environment. A recent poll conducted by *Conde Nast Traveler* revealed that:
 - C 91% of the respondents were concerned about the environmental conditions at their travel destinations;
 - C 50% claimed that the environment had become a factor in their travel planning over the last ten years;
 - C 25% have changed travel plans because of what they perceived to be an environmental issue at their chosen destination.

The Agreen@image created and sustained through an effective EMS will, therefore, provide Hotel X with an additional marketing tool.

- < Since many environmental measures are aimed at reducing the consumption of water, energy, chemicals and materials, an effective EMS will help the property save money and ensure the sustainability of the measures and actions that yield these savings.

During the course of the audit, the Sustainable Tourism team reviewed Hotel X's water, energy, chemicals and materials consumption practices; evaluated its policies, procedures and management structure; identified ways to improve its environmental performance and develop an effective EMS. As illustrated in the following section, the audit revealed that Hotel X could greatly benefit from becoming a more Aenvironmentally friendly@property.

Summary of Implementation Costs and Paybacks

The following table summarizes the costs and benefits of 13 of the more than 55 recommendations presented in Chapter 4 of this report.

Project number and description	Environmental benefits	Financial savings	Implementation cost	Payback period
E-7 Install 2.2 (or 2.5) USG/min aerators on all villa kitchen faucets.	<ul style="list-style-type: none"> Reduces water consumption and wastewater generation Improves the performance of the septic tanks and French drains Saves energy 	760 US\$/year	55 US\$	0.9 month
E-8 Install 1.5 USG/min aerators in all guest bathrooms.	<ul style="list-style-type: none"> Reduces water consumption and wastewater generation Improves the performance of the septic tanks and French drains Saves energy 	210 US\$/year	110 US\$	7 months
E-14 Install low-flow shower heads in all guest bathrooms	<ul style="list-style-type: none"> Reduces water consumption and wastewater generation Improves the performance of the septic tanks and French drains Saves energy 	6,970 US\$/year	440 US\$	0.8 month
E-15 Install tamper-proof low-flow shower heads in all staff bathrooms	<ul style="list-style-type: none"> Reduces water consumption and wastewater generation Improves the performance of the septic tanks and French drains 	440 US\$/year	60 US\$	1.6 months
E-17 Retrofit the existing conventional toilets with toilet dams, displacement devices or early-closure devices.	<ul style="list-style-type: none"> Reduces water consumption and wastewater generation Improves the performance of the septic tanks and French drains 	90 US\$/year	90 US\$	12 months
E-18 Install flow diverters in the water tanks of all toilets which have an excessively long toilet bowl refill cycle.	<ul style="list-style-type: none"> Reduces water consumption and wastewater generation Improves the performance of the septic tanks and French drains 	70 US\$/year	70 US\$	12 months
E-22 Harvest rainwater and use it to supply the property's laundry and other operation that do not require potable water	<ul style="list-style-type: none"> Reduces water consumption and wastewater generation Reduces the use of laundry chemicals 	3,220 US\$/year	2,780 US\$/year	10 months

E-23 Eliminate excessive lighting levels in public and garden areas. Reduce garden and public area nighttime illumination in areas where there is no guest activity.	C Saves energy	1,000 US\$/year	negligible	immediate
E-24 Replace incandescent bulbs with compact fluorescent lights in public and garden areas.	C Saves energy	5,550 US\$/year	1,070 US\$	8 months
E-28 Encourage guest to use natural ventilation rather than air-conditioning in guest rooms.	C Saves energy	1,510 US\$/year	not determined	not determined
E-29 Minimize infiltration of hot air in guest rooms through louvers and doors.	C Saves energy	1,000 US\$/year	500 US\$	6 months
E-32 In the future, upgrade the type of a/c units purchased for guest rooms.	C Saves energy	1,510 US\$/year	not determined	not determined
E-33 Consider replacing the electric water heater in the guest rooms with LPG water heaters.	C Saves energy	3,110 US\$/year	not determined	not determined

Summary of Initiatives Already Underway

To its credit, Hotel X has already adopted several initiatives that reduce the environmental impact of its activities. Some of the initiatives identified by the audit team are listed below.

Maintenance

- < Guest bedrooms are air-conditioned, but all other villa areas are cooled with ceiling fans and natural ventilation.
- < Hotel X uses energy efficient compact fluorescent lights in many of its garden lighting fixtures.
- < Hotel X uses a log book to track all maintenance requests, the date of the maintenance requests, and the name of the maintenance person who fixed the problem. This practice allows the property to identify recurring problems and ensure that maintenance requests are addressed in a timely manner.

Purchasing Department

- < Hotel X minimizes waste generation and reduces costs by using liquid soap dispensers, rather than individual soap bars, in public bathrooms.
- < The property's purchasing operations are controlled by only a few people. This practice reduces the number of orders placed, gives management greater control over the items purchased, and will facilitate the implementation of some of the changes suggested in this report.
- < Hotel X reduces costs and packaging waste by purchasing most housekeeping and laundry products in bulk rather than in small individual containers.

Guest Rooms and Housekeeping

- < Hotel X saves water, energy and chemicals by changing bed linens in guest rooms every two days instead of every day.
- < The property stores its guest room blankets in the closet instead of placing them on the bed. This practice reduces the need to frequently wash the blankets and minimizes the wear and tear on these items.
- < The property offers few bathroom amenities to its guests. Many hotels feel the need to provide their guests with shampoos, conditioners, lotions, bath gels, etc., a practice that is very costly and generates a great deal of waste.
- < Housekeepers save energy by turning off all air conditioners, lights, and ceiling fans when preparing guest rooms in the morning.
- < The property places few promotional items in guest rooms. These items are generally misused and damaged by guests and often only serve to increase the amount of waste generated by the property.
- < Housekeepers pay attention to dripping faucets, running toilets, and other leaks in guest rooms and report all maintenance problems to the front desk or directly to the maintenance staff.
- < Housekeepers always try to clear clogged drains or toilets with a plunger before requesting the help of the maintenance staff. A plunger should always be the first course of action for clearing clogs.

- < Housekeepers do not use disposable plastic bags to transport towels and sheets (whether clean or dirty) between guest rooms and the laundry.
- < There are no plastic liners in the guest bathroom garbage cans and used grocery bags are often recycled as garbage can liners in the villa kitchens.
- < The guest room floor mats are made from natural fibre which is durable and basically maintenance-free.
- < Housekeepers use durable rags rather than disposable paper towels in their cleaning operations. This practice saves the property money and reduces the generation of waste.
- < Housekeepers leave partially-used soap bars in guest bathrooms until check-out instead of replacing them daily.
- < Block leaders control the access to the supply room where housekeeping chemicals and products are stored. They record all items issued, the date of issue, the name of the housekeeper who requested the items, and villa where the items will be used. This practice allows the property to control the use of these products and probably reduces the property's purchasing costs.
- < The property provides each villa with a pitcher of potable (boiled) water instead of bottled water packaged in a disposable plastic bottle.

Laundry

- < The irons in the laundry are plugged in only when they are in use.
- < Heavily-soiled laundry is pre-soaked before it is placed in the washing machine. This practice reduces the volume of laundry that must be processed several times through the washer and dryer.

Bar

- < The bar does not use disposable plastic cups.
- < Hotel X's bartender gives out very few straws and does not use paper napkins as coasters.

Garden

- < Most yard waste is composted instead of being discarded as garbage.
- < The grounds staff uses buckets instead of disposable plastic bags to collect and transport yard waste around the property.

1. Introduction

1.1. Sustainable Tourism Project

The Sustainable Tourism Project is an activity funded by the U.S. Agency for International Development (USAID) that is designed to assist the tourism and hospitality industry implement effective environmental management systems (EMS).

The specific objectives of this project are: (1) to develop greater awareness and understanding of the benefits of environmental management systems and audits among hoteliers, restaurateurs, allied tourism businesses, as well as in the manufacturing industry; (2) to train local consultants on EMS auditing techniques; (3) to assist a select, representative number of tourism establishments in carrying out environmental audits; and (4) to help finance, on a cost-sharing basis, specific audit recommendations in the participating establishments to demonstrate the financial benefit of the systematic application of environmentally friendly practices and, thereby, encourage others in the tourism industry to do likewise. The Sustainable Tourism Project is being implemented by Hagler Bailly Services (USA) under the direction of USAID and the Tourist Association of Country X.

1.2. Audit Team

The audit of the Hotel X Villas was conducted by an interdisciplinary team in November 1998. The team members included Patricio Gonzalez Morel, Environmental Engineer, Hagler Bailly; Andreas Deppe, Energy Engineer, Hagler Bailly; and Cara Holley Montrief, Hotel Environmental Consultant.

The EMS audit consisted of a detailed analysis of all departments and key service areas designed to identify the environmental aspects and impacts of the property's activities, and to formulate recommendations on how to improve the property's environmental performance and its environmental management system (EMS).

1.3. Audit Protocol

The audit protocols used by the audit team covered the following issues:

- < Water use and wastewater generation
- < Energy use
- < Solid waste generation and handling
- < Chemicals use and management
- < Hotel procedures and operations

2. Background Information

2.1. Description of the Property

Hotel X covers 12 acres of land overlooking bay X and offers 12 one-bedroom apartments and 16 two-bedroom, two-storey apartments. All apartments have a full kitchen, a living room and patio or terrace. The hotel does not have a restaurant, instead each apartment is assigned a housekeeper who purchases groceries and cooks for the guests. Hotel X does however have a large kitchen which is used only for special functions, such as weddings and conferences.

The property's facilities include an air conditioned meeting room, a swimming pool, two lighted tennis courts, a bar, a television room, a nature trail which surrounds the property, and access to the nearby Beach X.

2.2. Occupancy Data

The reference occupancy information given by Hotel X covers a 12-month period from September 1997 to August 1998. This data is summarized in the following table and is used as the basis for many of the calculations presented in this report.

Month	Occupancy in room nights (RN)	Occupancy in guest nights (GN)
September 1997	234	468
October	405	810
November	328	656
December	575	1,150
January 1998	510	1,020
February	493	986
March	436	872
April	415	830
May	405	810
June	287	574
July	411	822
August 1998	587	1,174
Annual total	5,086	10,172

These figures yield the following occupancy criteria for Hotel X:

Average hotel occupancy = 424 RN/month or 848 GN/month

Average room occupancy = 2.0 Guest nights / Room night

Notes: 1) Since the hotel manager lives in one of the two-bedroom villas, the % occupancy of the property is based on a total of 42 rather than 44 rooms.

2) The guest night figures shown in the table assume that Hotel X has an average room occupancy of 2.0 guest nights per room night.

2.3. Water Consumption and Wastewater Generation

2.3.1. Water supply and wastewater disposal at Hotel X

- < The water consumed at Hotel X is purchased from the Local Water Commission. The LWC water enters the property through a single metered line and is piped directly to all hotel areas.

Hotel X is also equipped with a 11,500 IG elevated storage tank which supplies water by gravity to all of the property during LWC water lockouts or times of low water pressure in the LWC main. Given the property's present water consumption levels, this storage tank can supply Hotel X with water during approximately 30 hours.

Based on Hotel X's August 1998 water bill, the present cost of LWC water is 0.0060 US\$ per imperial gallon.

- < The bulk of the wastewater generated by Hotel X is disposed of on-site through a series of septic tanks and French drains. The septic tanks are pumped out twice per year at great expense.

The laundry's graywater is currently discharged to the ground down a heavily wooded hillside next to the laundry building.

2.3.2. Current water consumption and costs at Hotel X

The property's monthly water use and its water use index - that is, the monthly water consumption divided by the monthly occupancy - for September 1997 to August 1998 are given in the following table.

Month	Monthly water use (IG/month)	Occupancy (GN/month)	Monthly water use index (IG/GN)
September 1997	153,000	468	327
October	393,000	810	485
November	299,000	656	456
December	386,000	1,150	336
January 1998	232,000	1,020	227
February	243,000	986	246
March	269,000	872	308
April	251,000	830	302
May	277,000	810	342
June	237,000	574	413
July	355,000	822	432
August 1998	232,000	1,174	198
Annual total	3,327,000	10,172	
Note: IG = imperial gallon, 1 IG = 1.2 US gallons			

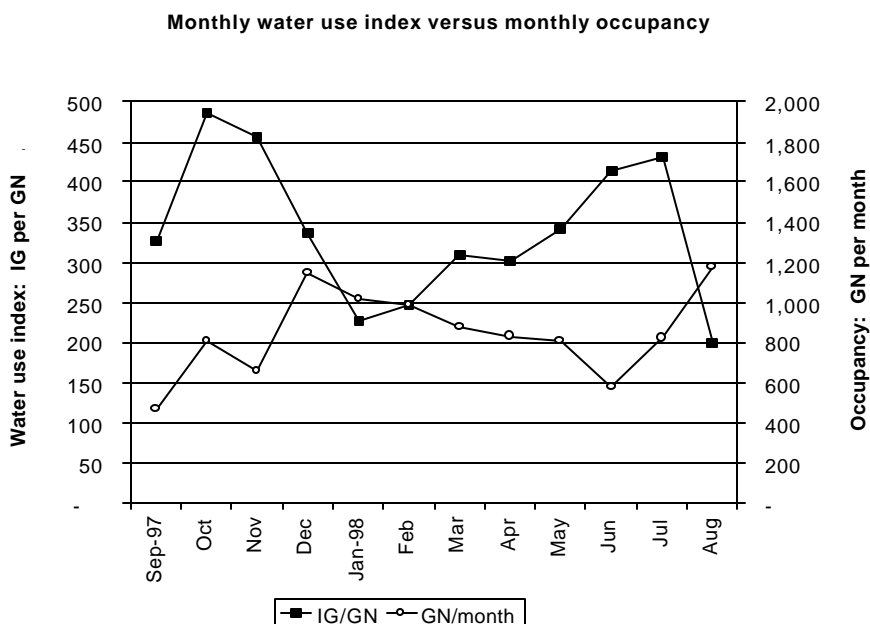
This data yields the following water use criteria for Hotel X:

$$\begin{aligned}\text{Average water use} &= (3,327,000 \text{ IG/year}) / (12 \text{ months/year}) \\ &= 277,200 \text{ IG/month}\end{aligned}$$

$$\begin{aligned}\text{Annual water use index} &= (\text{annual water consumption}) / (\text{annual occupancy}) \\ &= (3,327,000 \text{ IG/year}) / (10,172 \text{ GN/year}) \\ &= 327 \text{ IG/GN}\end{aligned}$$

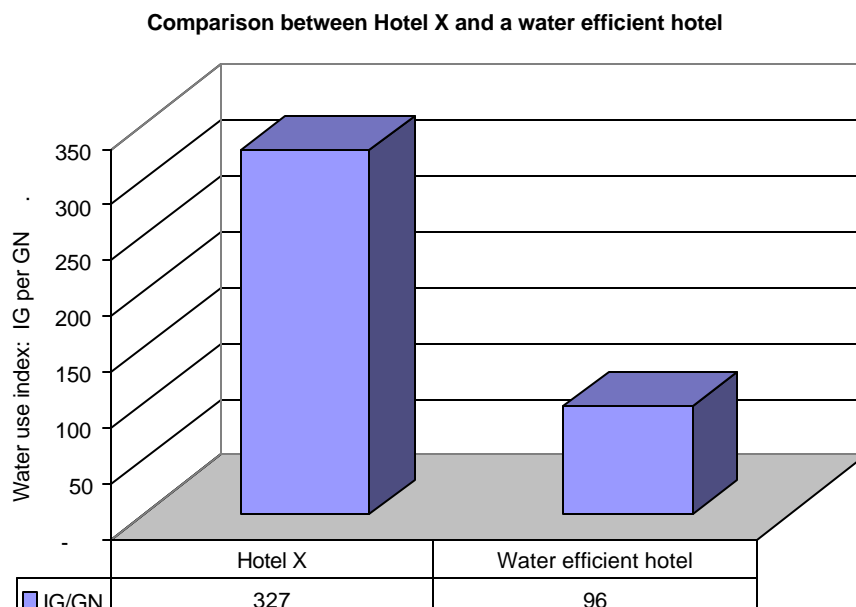
The annual water use index figure calculated above is the prime indicator of how efficiently this property uses water in its operations. A comparison between Hotel X and a water efficient property is presented in Section 2.3.3 of this report.

The monthly water use index - that is, the monthly water consumption divided by the monthly occupancy - can be used to monitor how efficiently the property uses its water supply from month to month. The variation in Hotel X's water use index is depicted in the following graph.



As shown above, Hotel X's monthly water use index fluctuates widely over time, ranging from a low of 198 IG/GN in August 1998 to a high of 485 IG/GN in October 1997. Although the monthly water use index is expected to vary in time due to changes in weather, occupancy rates, guest type, the marked inverse relationship shown on the graph suggests that the amount of water actually consumed by the guests may be small compared to Hotel X's water base load - that is, the water that is used by the staff in all of the property's support activities. Therefore, in addition to optimizing water efficiency in the guest villas, Hotel X should also strive to control and reduce its water base load.

2.3.3 Comparison between Hotel X and a water efficient property



The comparison between Hotel X's current performance and the water efficiency benchmark established by the International Hotels Environmental Initiative reveals that this property uses too much water. Some of the key factors that contribute to Hotel X's high water use include:

- < few guest bathrooms are equipped with effective low-flow shower heads;
- < all shower heads in employee changing rooms are damaged or inefficient;
- < few faucets in the villa bathrooms and kitchens are equipped with flow aerators;
- < few bathrooms are equipped with water-saving toilets;
- < the elevated storage tank is not equipped with a float valve and can therefore easily overflow;
- < the property is more than 25 year old and has probably several weak water pipes;
- < there are no sub-meters on property to facilitate the detection of underground water leaks.

Because of the high cost of LWC water, Hotel X could achieve significant savings by engaging in an aggressive water conservation program. The savings that could be achieved through water conservations are summarized below.

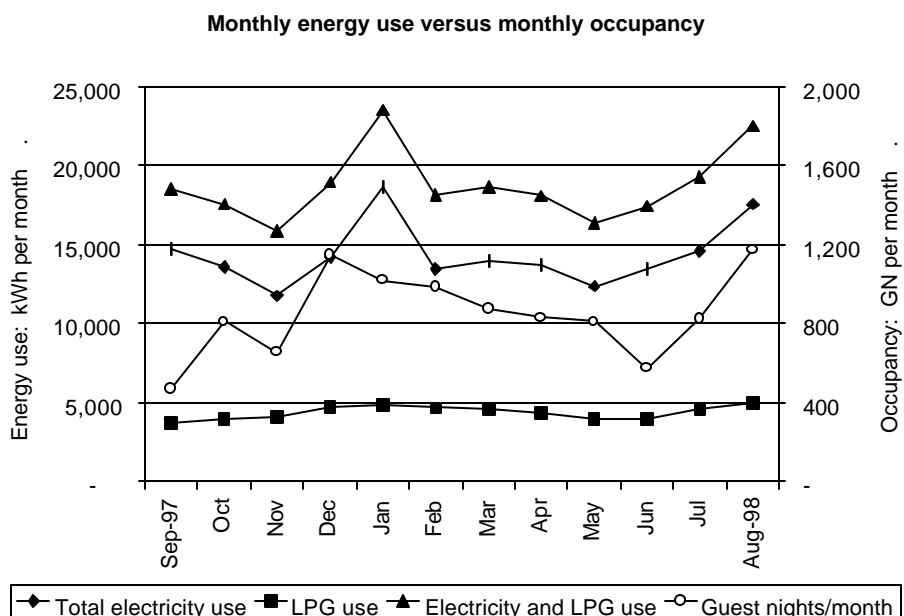
Savings achieved if Hotel X became an efficient property	
Water savings	Financial savings
2,350,000 IG/year	14,030 US\$/year

In addition to the direct financial benefits, a reduction in water consumption will also reduce the volume of wastewater discharged by Hotel X and will, thereby, improve the performance and degree of treatment provided by this property's septic tanks and French drains.

2.4. Energy Consumption and Costs

2.4.1. Current energy consumption and costs at Hotel X

The energy consumption information collected from Hotel X's bills is presented graphically in the following chart.



This data yields the following energy cost and consumption criteria for Hotel X.

Energy costs			
	US\$/GN	US\$/RN	US\$/year
Total electricity cost	2.25	4.47	22,800
LPG cost	0.33	0.64	3,300
Total energy cost	2.56	5.14	26,100

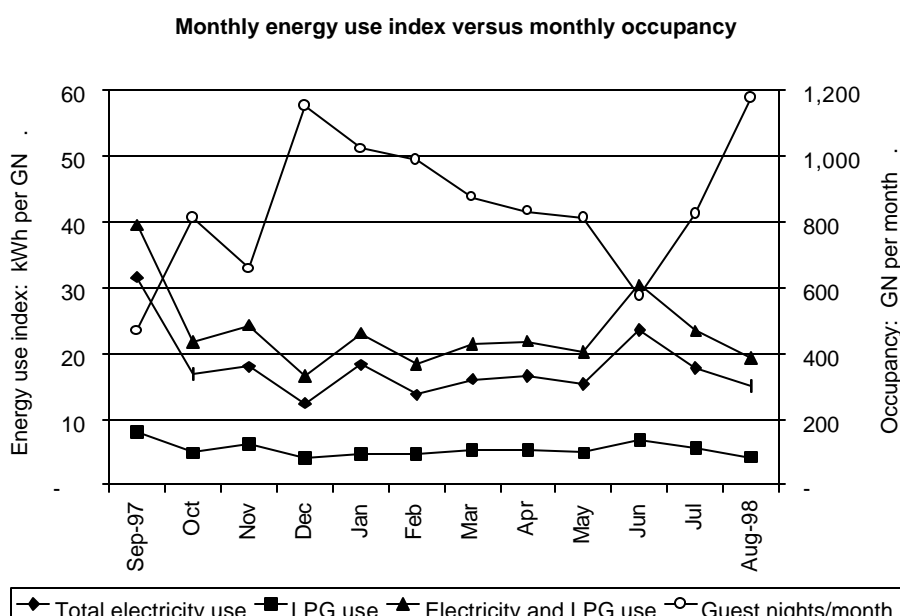
Energy consumption			
	kWh/GN	kWh/RN	kWh/year
Total electricity use	17	34	172,200
LPG use	5	10	52,600
Total energy consumption	22	44	224,800
Note: The conversion of LPG to kWh is based on a heating value of 32.22 kWh/IG of LPG.			

- < As can be seen in these tables, electricity accounts for 77% of Hotel X's total energy consumption and for 88% of its total energy cost.

< Unit costs of the energy sources used at Hotel X:

- C Average electricity cost = 0.132 US\$/kWh
- C Average LPG cost = 0.444 US\$/liter (or 0.063 US\$/kWh).

The monthly energy use index is an indicator that can be utilized to estimate how efficiently the property uses its energy throughout the year. The monthly energy use index is equal to the monthly energy consumption (for electricity and LPG all expressed in kWh) divided by the monthly occupancy in GN. The fluctuation in Hotel X's monthly energy use index is depicted in the following chart.



As shown in the preceding graph, the total energy use index rises during times of low occupancy and drops during times of high occupancy. Although the energy use index is expected to vary with time due to changes in weather, guest type and occupancy rates, the marked inverse relationship shown on the graph suggests that Hotel X's energy base load is exceedingly large compared to the energy that is actually consumed by the individual guests. Therefore, in addition to optimizing the energy efficiency of its guest villas, Hotel X should also strive to control and reduce its energy base load (pool pumps, public area and garden lighting, laundry operations, etc.).

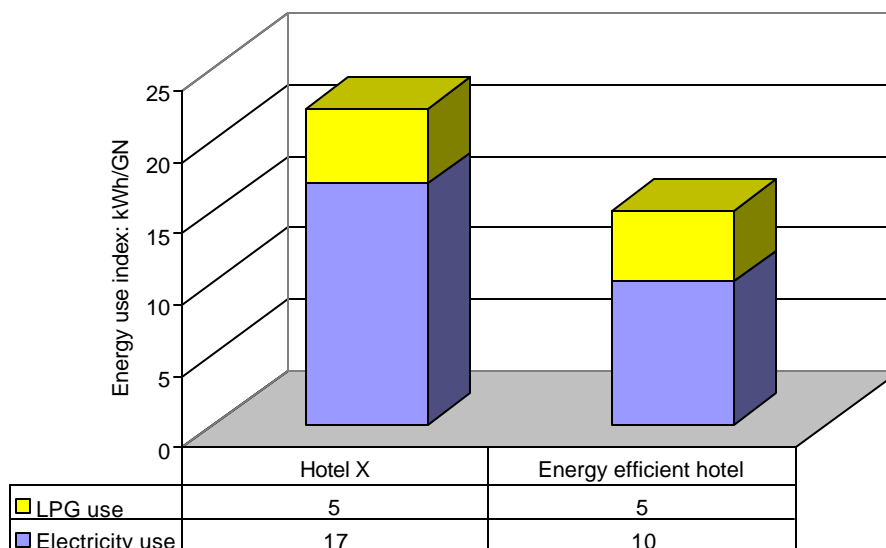
The following additional information on Hotel X's energy use and costs is included in Appendix II.

< Table - Detailed energy consumption and costs - Hotel X 1997-1998

< Table - Energy consumption and costs input - Hotel X 1997-1998

2.4.2. Comparison between Hotel X and an energy efficiency property

Comparison between Hotel X and an energy efficient hotel



As shown above, Hotel X's energy use index is approximately 45% higher than that of an energy efficient hotel.

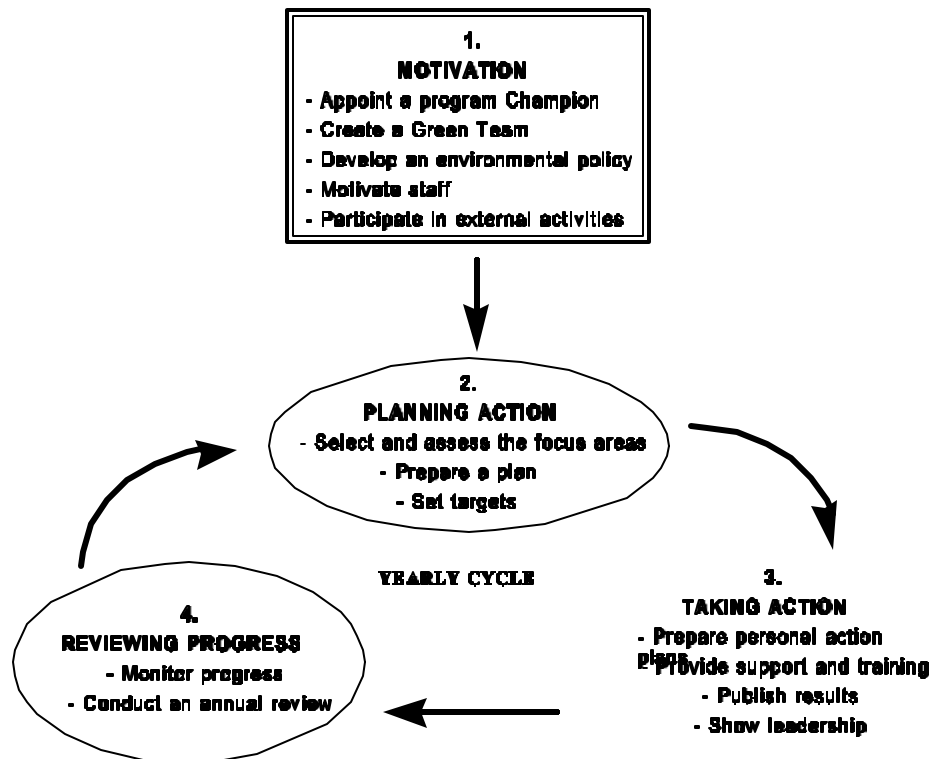
Some of the factors that contribute to Hotel X's comparatively high energy use index include:

- < The property uses mainly incandescent bulbs for its public area lighting, even though compact fluorescent bulbs are used for the garden walkway lights. The property also uses extremely bright floodlights in its gardens at night.
- < Hotel X uses electric water heaters rather than gas or solar water heaters.
- < The bedrooms are not designed to encourage guests to use natural ventilation rather than air-conditioning.
- < The poorly insulated bedroom roofs and the large vented bathroom skylights increase the heat load on the villas' a/c units.
- < In most bedrooms, the settings of the a/c units cannot be adjusted by the guests.
- < Hotel X wastes a large amount of hot water since most villa faucets are not fitted with flow aerators and most guest bathrooms are not equipped with effective low-flow shower heads.

3. Guidelines for the Development of an Environmental Management System

3.1. Environmental Management System (EMS) Overview

Becoming an environmentally friendly property is not a challenge that can be met overnight. It is a long-term commitment and a continuous process of improvement which should be integrated in the daily operations at a pace which is right for each property. The key phases in the creation and development of an effective environmental management system are illustrated below.



Note: This EMS cycle is based on the approach developed by the International Hotels Environmental Initiative.

The four phases are:

Motivation -- in which you begin to integrate the initiative in your property by (1) appointing a **Champion** to coordinate the program, (2) creating a **Green Team** to assist in the implementation

and monitoring of the program, (3) developing a policy which defines the property's environmental objectives and targets, and (4) by motivating the staff to participate and contribute to the program.

Planning action -- in which you select and conduct a detailed review of the property's priority areas, identify measures to be taken, prepare an action plan and set a timetable for the implementation of the program.

Making it happen -- in which you gain staff commitment for the action plan, allocate responsibilities, and implement the plan.

Reviewing process -- in which you monitor progress against set targets and objectives, conduct an annual review of overall progress to assess the successes and failures, and set priorities for the coming year.

As shown above, phases 2, 3 and 4 form a yearly environmental management cycle. Each year, the property will go through this cycle again, using the review of the previous year's successes and failures to improve the effectiveness of its EMS and revise, if necessary, its environmental policy.

3.2. Motivation

3.2.1. Appoint the environmental program's AChampion®

Once the hotel is ready to move ahead with its environmental program, Hotel X will need to appoint a AChampion® who will have the responsibility for coordinating and implementing the environmental program. This person must have a good operational knowledge of the hotel, the respect of other employees, a commitment to the project, and the full support of the property's owners and top management. The Champion will keep the environmental program on line, ensure that good business and environmental results are achieved, and ensure the participation and cooperation of all staff members.

3.2.2. Create a AGreen Team®

The creation of a AGreen Team® is crucial to introducing and implementing the environmental policy. The functions of the Green Team include:

- < assisting the program Champion in the day-to-day management, supervision and troubleshooting of the environmental program;
- < keeping the property's staff motivated and dedicated to the principles of the environmental program;
- < developing new ideas and strategies for improving the program;

- < acting as the principal link between the property and local community groups or environmental organizations.

To be most effective, the Green Team must be composed of highly motivated individuals, selected from each of the property's departments and representing all levels of employee hierarchy -- from executive-level to line-level employees. The actual size of the Green Team will depend on the requirements of Hotel X's environmental program; however, when assembling the team, keep in mind that as the group gets larger, the team as a whole becomes less focused and less productive.

The employees selected for the Green Team must have the motivation and character needed to ensure the success and the dissemination of the program. Criteria for the selection of team members may include:

- < recommendations by managers or supervisors;
- < nomination by fellow employees; or
- < a simple application process which requires the candidates to explain their expected contribution to the environmental program and their reasons for wanting to join the team.

Note: Hotel X should create more personalized names for the AChampion@ and AGreen Team@ to reflect the property's Apersonality.@ In this report, the terms AProgram Champion@ and AGreen Team@ are used as generic names to represent two key components of an effective EMS.

3.2.3. Develop an environmental policy for Hotel X

An environmental policy is an important tool for communicating, both internally to employees and externally to guests, that the property is serious about its role in preserving and protecting the environment. The policy should, therefore, embody the property's commitment to the environment and define the goals it wishes to achieve.

The formulation of the environmental policy should be a concerted effort, involving management, the program Champion, the Green Team and all interested staff members. This combined effort will ensure that the environmental policy is understood and respected by all employees, and will provide the staff with a sense of ownership over the property's environmental program.

The breadth of the environmental policy adopted by the hotel will define the complexity and magnitude of the environmental management system that will be needed to put the policy's words into actions. The property is, therefore, advised to develop a first policy that is appropriate to the nature and scale of its environmental impact, but not overly ambitious. The first environmental policy should include manageable commitments that bring obvious benefits to the property or help remedy its most significant environmental impacts. Examples of commitments appropriate for a first environmental policy include:

- < safeguarding natural resources by achieving a more efficient use of water, energy, chemicals and materials;
- < preventing pollution by reducing the amount of waste generated by the property;
- < complying with all applicable environmental regulations.

After mastering the basic principles and operations of its EMS, Hotel X should broaden the scope of its environmental policy and review its objectives and targets. An example of a complete and comprehensive environmental policy is given below.

The environmental policy must be clearly communicated and explained to all current employees and all new hires. It should be discussed in staff meetings, included in employee handbooks and posted on the staff notice board. Once the property has put into practice the key elements of its EMS and achieved the first noticeable results, management should place a framed copy of the environmental policy in the hotel lobby, in full view to all guests and visitors.

Hotel Environmental Policy

By the International Hotels Environmental Initiative

We recognize that our business has an important role to play in protecting and enhancing the environment for future generations, and to help secure the long-term sustainability of the tourism industry.

To this end our hotel is committed to taking action:

- C** *To achieve sound environmental practices across our entire operation*
- C** *To comply fully with all environmental legislation*
- C** *To minimize our use of energy, water and materials*
- C** *To reduce our pollution to a minimum and, where appropriate, to treat effluents*
- C** *To invite our customers, suppliers and contractors to participate in our efforts to protect the environment*
- C** *Where we can, to work with others in the tourism industry, in public agencies and the community to achieve wider environmental goals*
- C** *To provide all employees with the training and resources required to meet our objectives*
- C** *To openly communicate our policies and practices to interested parties*
- C** *To monitor and record our environmental impacts on a regular basis and compare our performance with our policies, objectives and targets*

3.2.4. Motivate the staff

The hotel does not currently have regular staff meetings. Monthly, or at least quarterly, meetings of all employees are important to establishing communication between management and employees and to building staff morale. More frequent meetings of department heads will build teamwork among departments and keep everyone apprised of important issues in the hotel. It is important that the hotel begin holding meetings of staff and department heads as soon as possible. These meetings do not have to be lengthy -- in fact, they will typically be more effective if a brief agenda is set beforehand.

Management should use these staff meetings to inform all employees of the environmental program's objectives and to call for their ideas and support. Involving the staff not only helps gain their commitment to the initiative, but also allows the program to benefit from their creativity and experience: line-level employees often know best how to reduce waste and improve efficiency, and how to carry out specific programs and actions in the most practical manner. The Champion and the Green Team should, therefore, strive to gain the support and collaboration of their colleagues at all levels and in all the departments of this property.

In most cases, staff will not effectively practice environmentally conscious behavior unless they are given proper training and motivated through an appropriate incentive program. For example, employees will engage more willingly in good housekeeping practices once they are clearly instructed on what must be done, informed of the benefits of these practices, and encouraged and rewarded by management. Since staff participation in the environmental program can generally save the property a lot of money, management should take the time to devise an appropriate and effective incentive program.

Incentives may include monetary rewards such as sharing with the staff part of the water and energy savings achieved through the environmental program, or giving bonuses to particularly deserving employees. Incentives may also include non-monetary rewards such as extra paid vacation days, parties and gifts (e.g., t-shirts with the hotel's Agreen team logo, gift certificates).

3.2.5. Participate in external activities

Hotel X's management and staff should get involved in local and national initiatives, attend events, subscribe to environmental publications, discuss environmental issues with colleagues in the industry, and promote Anetworking of good ideas through the local Chapter of the Tourist Association. Participation in external activities will help the property gain a deeper understanding of the issues, learn how others are tackling their environmental problems, and enhance the property's reputation in the industry.

An effective and productive way for Hotel X to further enhance its environmental program is to

develop strong community relationships. By actively participating in local civic and environmental activities, Hotel X will highlight its leadership role and bolster the motivation of its employees by allowing them to positively affect the community in which they live and by providing them with alternate means for professional growth.

3.3. Planning action

3.3.1. Select and assess the program=s focus areas

The Green Team, under the leadership of the Program Champion, must review the property=s activities in order to determine which areas, departments or issues should be targeted first by the environmental management program. This review process is generally conducted by:

- 1) identifying the environmental aspects of the property=s activities -- an environmental aspect is an element of a property=s activity which interacts, in a beneficial or detrimental manner, with the environment;
- 2) evaluating these environmental aspects in order to determine which of these have a significant negative impact on the environment;
- 3) highlighting the areas of significant negative environmental impact that can be affected through the property=s environmental program.

The environmental aspects of the various activities carried out in hotels can generally be classified in at least one of the following categories:

- C water use;
- C energy use;
- C solid waste generation;
- C generation of water pollutants;
- C use of hazardous products;
- C generation of air emissions; and
- C damage to the ecosystem.

A description of the environmental impacts and the types of activities associated with Hotel X=s principal environmental aspects is given in Appendix II.

The identification of environmental aspects and impacts provides the property with a sense of its current environmental performance and enables the property to establish the environmental targets and objectives of its future EMS activities. The background information and the recommendations given in

this report should help Hotel X identify its principal priority areas.

After selecting the priority areas for the environmental program, the Green Team will have to conduct a detailed review of each priority area. The objectives of this review process are:

- 1) To assess current performance in each particular priority area. Current performance can be best evaluated by calculating environmental performance indicators from the property's energy, water and solid waste bills, chemicals and materials purchase records, and hotel occupancy records. Examples of the type of indicators which can be used by Hotel X to gauge its current environmental performance include:

- C gallons of water consumed by the property per guest night
- C kWh consumed by the property per guest night
- C number of tanker loads pumped from the septic tank per 1,000 guest nights
- C gallons of water consumed per pound of material processed through the laundry
- C pounds of laundry (or number of wash loads) processed per guest night
- C pounds of laundry chemicals used per guest night
- C pounds (or volume) of solid waste hauled out of the property per guest night
- C pounds of materials (glass, paper, plastic, metals) recycled per guest night
- C pounds of a specific chemical product used per guest night

This initial assessment is very important since it provides the benchmark against which progress will be measured in a particular focus area (e.g., the laundry room) or in the property as a whole.

- 2) To identify improvement options. The Green Team will need to identify what is already being achieved in order to gain an idea of where improvements can be made without sacrificing other operational criteria. This is where discussion with key staff in each area is not only very useful (they often understand best where and how improvements can be made) but also essential to gain their commitment to the process.

The findings and conclusions of this preliminary review process should be recorded so that they may be used, at the end of the yearly EMS cycle, to evaluate the results and achievements of the environmental program.

3.3.2. Prepare a plan

The preparation of the action plan involves four important steps:

- C decide which of the actions identified by the review should be pursued first;
- C define the steps to implement each action;
- C allocate responsibility for these steps;
- C set target dates for action.

The action plan should prioritize:

- C actions needed to meet environmental laws and standards;
- C good management practices which are simple and will bring a combination of environmental and business benefits;
- C investment measures that have a rapid payback.

The action plan forms given in Appendix II illustrate the outputs of this task.

The tasks listed in the plan may include evaluating the performance, cost and operational implications of an option. It may be wise to try out an idea before fully implementing it.

The audit team recommends that the hotel begin with back-of-house environmental improvements first. Since Hotel X has not yet begun a comprehensive environmental effort, it would not be advisable to start its program with an initiative such as a Linens and Towels Reuse Program, which solicits guest participation. These types of programs are best implemented (and the guests are more likely to participate) when the guest can see that the hotel has made some efforts toward conservation.

3.3.3. Set targets

The purpose of setting targets is to provide clear benchmarks against which to measure the success of the program. However, since changing environmental practice takes time and effort, the Green Team should carefully evaluate the program's targets. It is often better to set targets which are achievable and which can provide real satisfaction once achieved, than to set over-ambitious targets which may lead to failure and staff demoralization.

The targets established by the Green Team for the property's environmental program may be based either on environmental performance indicators or on specific actions that must be completed by a given date.

Examples of indicator-based targets include:

- C Reduce the amount of water consumed by the property per guest night in 1998 by 10% with

respect to the 1997 figure.

- C Reduce the mass of solid waste hauled out of the property per guest night in 1998 by 20% with respect to the 1997 figure.
- C Before the end of 1998, achieve a water use ratio of 2.1 IG per pound of laundry processed.

Examples of action-based targets include:

- C Start a composting program for all garden waste by March 1998.
- C Develop a checklist for a guest room preventive maintenance program by January 1998 and begin the program by February 1998.

3.4. Taking action

3.4.1. Prepare personal action plans

Hotel X's employees must clearly understand that responsibility for minimizing the waste of energy, conserving water, recycling materials, and other tasks defined by the property's environmental program is part of their job. They must be aware that they will be recognized if they carry out these responsibilities successfully, and reprimanded if they do not. The key to achieving this objective is to translate the overall action plan into personal action plans which detail the specific and general actions expected of the employees.

A sample personal action plan is provided in Appendix II.

3.4.2. Provide support and training

The key to success for any environmental program is education. Employees must learn how to perform their daily tasks in a manner that will maximize conservation, and understand why Hotel X is undertaking this effort and the positive effects this effort will have on them, their families and the local community. This understanding will provide a sense of ownership in the environmental effort that will contribute to its long-term success.

The objective of the training program is simple: to ensure that all employees understand the property's important environmental issues and have acquired the skills to perform their work in an environmentally responsible manner.

3.4.3. Publish results

Employees want to know the results of their endeavors. Management and the Green Team should,

therefore, regularly post the results of monitoring on the staff notice board, congratulate successes, and reward individuals or departments that have done particularly well.

Many hotels put up energy and water consumption monitoring results on their staff notice boards. The results for the current month are displayed in a simple graphic format and compared with the previous month and the same month in the previous year. Staff take great interest and pride in these results.

Hotel X may also decide to publicize the results of its environmental program in promotional literature.

3.4.4. Show leadership

Achieving staff commitment is an ongoing task -- if enthusiasm is to be maintained, staff need to be constantly reminded of the objectives and targets which have been set. Management and the Green Team must demonstrate its continued commitment and leadership, notice when action is being taken and when lapses occur, and continually refresh enthusiasm in the challenge of transforming Hotel X into an environmentally friendly property. Like customer care, good environmental management practices must become part of the management culture.

3.5. Reviewing progress

3.5.1. Monitor progress

The saying "You can't manage what you don't measure" applies as much to environmental management as to other areas. Hotel X needs to establish good monitoring procedures to ensure that the program is working and achieving its objectives. Monitoring should be sufficiently frequent to enable corrective action to be taken if there is a significant change in the average daily consumption or a large deviation from targeted performance. Ideally, water and electricity meters should be checked on a daily basis. This activity need not take a member of staff more than 30 minutes per week.

Examples of water and energy monitoring forms are provided in Appendix II.
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Especially in the early days of the program, the Green Team should frequently hold short meetings with relevant individuals to review the progress made and to help sort out problems as they arise.

Effective utility metering will pay back very rapidly. Some hotels have installed separate utility metering for different parts of the hotel. This enables them to better identify where energy or water wastage is occurring. Typically, the cost of installing new meters will be met from utility cost savings in the first year.

3.5.2. Conduct an annual review

Once a year, Hotel X will need to step back to check the progress in its environmental performance. This review may be conducted by the Champion and take the form of a short report which contains target, results and monitoring information related to the implemented actions. Alternatively, management may prefer to use independent consultants if it feels that Hotel X does not have the resources or in-house expertise needed to perform this task. The review should cover the property's environmental management capabilities as well as the progress made with specific environmental actions. It should include:

- < A general review of the property's environmental performance to assess what progress has been made, and to help re-prioritize action.
- < A summary of measured achievements against the targets and objectives.
- < Discussions with relevant staff to identify the difficulties encountered and the successes achieved, as well as their recommendations for future actions.

This review process is invaluable. It will highlight problem areas as well as help identify the most appropriate environmental management approach for Hotel X. Management and the Green Team can then begin to plan for the coming year -- but this time on the basis of the experience acquired over the past year.

4. Recommendations for Improving the Property's Environmental Performance

This chapter describes the recommendations proposed by the audit team to help the property improve its efficiency and at the same time minimize its impact on the environment. These recommendations are classified by department or area of responsibility - for example, Property Management, Maintenance, Purchasing Department, Housekeeping, Laundry and Kitchen.

Whenever possible, the impact of the recommendations is quantified through detailed calculations and the key parameters related to the implementation of the recommendations are listed in a summary box.

The detailed recommendation calculations are generally included as individual calculation sheets in Appendix I of this report.

4.1. Property management

General issues

M-1 Put in place a Green Team and start implementing an Environmental Management System (EMS) at Hotel X.

A Green Team and an EMS will help Hotel X improve its environmental performance, and achieve and sustain its environmental performance objectives. The development of an EMS and the formation of a Green Team are detailed in Chapter 3 of this report.

M-2 Communicate the property's environmental program to the guests.

The front desk should introduce the guests to the property's environmental program during check-in. Guests should be made aware of and invited to participate in Hotel X's efforts to preserve City X's environment.

M-3 Train and motivate employees to conserve water, energy, chemicals and materials.

- < Use staff meeting or training sessions to educate employees on the financial and environmental cost of their actions; discuss the ways in which they can reduce their consumption of energy, water, chemicals and materials; and collect ideas for improving the property's environmental performance and efficiency. Simple examples could be used to convey the message that careless practices significantly affect the profitability of the property:

Question: What is the cost of letting a single cold water tap run for 1 hour per day?

Answer: 90,000 IG or 555 US\$ per year.

Question: What is the cost of leaving a single air-conditioner running needlessly overnight?

Answer: 2,500 kWh or 333 US\$ per year.

Post signs in key areas to remind employees to conserve water, energy, chemicals and materials.

Solid waste

M-4 Implement a property-wide waste management program.

Hotel X should implement a property-wide waste management program to reduce, reuse and recycle all possible wastes that are currently generated in its operations. An effective waste management program will significantly minimize the property's impact on the environment, and save money by improving the use of materials, resources and energy.

1) Reduce the generation of waste

Hotel X can reduce the impact and the amount of waste it produces by:

- < using materials efficiently and discarding them only when they are no longer fit for use;
- < using durable goods which need to be discarded less frequently;
- < avoiding the purchase of excessively packaged goods; and
- < minimizing the use of hazardous materials and products that harm the environment.

Reducing the generation of waste is obviously the first option that should be considered by Hotel X. This approach fosters the efficient use of resources, and reduces the volume of waste material that must be handled by employees and hauled away to the dump. The bulk of the responsibility for reducing waste generation generally lies with management and the purchasing department: they decide what is brought into the property and thereby determine what eventually leaves the property as waste.

Examples of waste reduction measures include:

- < Avoid purchasing items that are excessively packaged (e.g., foods, beverages, amenities, chemicals, cleaning products, appliances). Packaging alone can account for up to 40% of a hotel's waste stream.
- < Purchase food items in bulk rather than in individually packaged portions (e.g., sugar, salt, pepper, jams, condiments, butter, cereals, syrup, cream, juice). Bulk items are less expensive and create less packaging waste.
- < Reduce or eliminate the use of disposable items such as plates, cups, tableware, paper napkins and place mats.

- < Minimize the use of straws.
- < Use durable coasters instead of paper napkins which must be replaced with every drink.
- < Use cloth cleaning rags instead of disposable paper towels.
- < Use cloth bags or baskets instead of plastic bags to collect and return guest laundry, towels and linens.
- < Install soap dispensers in guest bathrooms, public bathrooms and employee locker rooms.
- < Use refillable containers for chemicals and cleaners. For example, replace aerosols with products that can be purchased in bulk and dispensed from refillable pump bottles.
- < Avoid using laundry, kitchen, or housekeeping detergents which contain phosphates.
- < Minimize the purchase and control the use of harsh or hazardous chemicals (e.g., drain cleaning agents, solvents, bleach).
- < Avoid using battery-powered appliances. If necessary, purchase rechargeable or mercury-free batteries. Most batteries contain heavy metals which can leach into the groundwater if the batteries are discarded in unlined trash dumps.
- < Coordinate the property's purchasing process to reduce the number of orders placed with each vendor. This will probably save money and reduce packaging waste.

2) Reuse all possible items

Whenever possible, Hotel X should reuse items in their original form for the same or a different purpose rather than disposing of them. If an item cannot be reused on-site, the property should investigate the possibility of selling it or giving it to employees, outsiders, charitable organizations, and local schools or businesses. Examples of reuse actions include:

- < Use laundry gray water to irrigate the grounds.
- < Serve only beverages that are packaged in reusable bottles which can be returned to the manufacturer.
- < Use the back side of computer and office paper for taking notes and writing internal memos.
- < Give preference to vendors that supply their products in returnable or refillable containers.
- < Remove used soap bars from guest bathrooms only at checkout. The used soap bars should be collected and reused around the property or given away to staff or charities. Soap bars can also be used (either as bars or as home-made liquid soap) to carry out a variety of cleaning operations on property.
- < Replace trash can liners only when these are soiled or unsuitable for further use.
- < Repair and reuse damaged furniture or donate it to interested parties.
- < Donate leftover food to charities.

3) Recycle all possible items

Many items that cannot be reused in their original form can be sold or given away to processors for recycling. Even if the property does not directly profit from its recycling efforts, diverting items from the waste stream should allow the property to reduce the frequency and the cost of trash collection.

The items which can generally be recycled include:

- < green waste from kitchen and garden (this material should be composted on-site);
- < white paper, mixed paper, newspaper and cardboard;
- < glass bottles and jars;
- < plastic bottles and containers made of PET (a plastic typically used for soft-drink and water bottles) and HDPE (a plastic typically used for milk jugs and chemical containers);
- < aluminum cans and foil;
- < steel cans;
- < steel scrap such as old pipes and appliances;
- < other metals such as copper and brass;
- < frying oil and grease.

M-5 Buy recycled paper products.

Purchase as many recycled paper products as possible (e.g., office paper, toilet paper, facial tissues, paper towels, etc.). Most paper products manufacturers have environmentally-friendly alternatives which contain a minimum of 20% POST CONSUMER waste. The price and quality of recycled paper products are often comparable to those of virgin paper products. By using recycled paper products, Hotel X will help foster the market for recycled products in Country X and convey its concern for the environment to its guests.

The auditors were unable to identify at Hotel X any paper products that contained at least 20% post-consumer fiber.

M-6 Minimize the amount of waste generated by the groceries purchased for the guest villas.

Consider the following suggestions:

- < Whenever possible buy items in bulk or in large portions. For example, purchase fruit juices in large bottles rather than in single-serving packages.
- < Do not purchase disposable items such as paper napkins and paper or styrofoam plates.
- < Give preference to grocery items that have a minimum amount of disposable packaging. For example, give preference to soft drinks that are packaged in returnable glass bottles.

M-7 Minimize the use of plastic bags to transport groceries from the supermarket to the

villas.

The supermarket should be asked to transport its groceries in reusable crates instead of in disposable plastic bags. Although some of these bags are used as liners in the kitchen garbage cans, many of them are discarded as waste.

Chemicals and hazardous products

M-8 Evaluate the chemicals used on property and switch whenever possible to more environmentally-friendly products.

Obtain ingredient lists or material safety data sheets (MSDS) from chemical manufacturers or distributors and keep them on file. This will help the property identify and possibly discontinue the use of certain hazardous products. It will also allow the property to better respond to emergencies related to the use of these hazardous chemicals.

4.2. Engineering

General issues

E-1 Implement a formal preventive maintenance program.

Hotel X should put in place a formal preventive maintenance program to cover guest rooms, and public and back-of-house areas. The equipment targeted by the preventive maintenance program should include:

- < all air-conditioning units
- < villa water heaters
- < plumbing fixtures (toilets, shower heads, and faucets)
- < windows, louvers and doors to minimize the infiltration of outside air in air conditioned areas
- < kitchen equipment in the villas as well as in the property's main kitchen
- < laundry washers and dryers
- < light fixtures throughout the property

Hotel X is already tracking maintenance activities in a log book as problems arise but should also develop a written schedule for all regular maintenance activities. A preventive maintenance program will increase the service life and the operating efficiency of Hotel X's equipment and will reduce the use of energy, water, chemicals, and materials.

E-2 Establish a controlled procedure to report and track maintenance requests and maintenance operations.

Management should define a procedure that will allow employees to report maintenance problems to the maintenance department in a rapid and effective manner. For example, housekeepers could fill out maintenance request forms and submit them to their supervisors, the front desk or directly to the maintenance staff. As problems are reported, they should be documented and filed in the hotel's maintenance log book.

At the present time, the staff procedures for reporting maintenance issues are very inconsistent.

E-3 Implement a monitoring program.

Implement a program to monitor the amount of energy, water and key chemicals or materials consumed by the property. Calculate at the end of each month the amount of electricity, LPG, water and chemicals that was consumed per guest night (i.e., gallons of water/guest night, kWh/guest night, etc...). This data will help the property:

- < define its normal consumption patterns;
- < identify any unusual shifts in consumption which may indicate equipment problems (e.g., water leaks) or operational problems;
- < ensure that employees are complying with water, energy and materials conservation guidelines;
- < ensure the effectiveness of preventive maintenance operations; and,
- < evaluate the progress of the property's conservation and environmental efforts.

As part of its monitoring program, Hotel X should consider installing and tracking sub-meters in key or high water use areas (villa blocks, laundry).

Monitoring should be sufficiently frequent to enable the property to take corrective action if there is a significant change in consumption or a large deviation from targeted performance. Ideally, water and electricity meters should be checked and the water and electricity consumption should be calculated at least every two or three days. Monitoring utility meters requires a minimum amount of labor.

Samples of water and electricity monitoring forms are presented in Appendix II.

Water

E-4 Implement a property-wide water conservation program.

Water consumption at Hotel X (327 imperial gallons per guest night) is greater than the industry average for a water efficient property (96 Imperial gallons per guest night). Given the high cost of LWC water, it is in this property's best interest to engage in an aggressive water conservation program.

A water conservation program will also reduce the volume of wastewater discharged by Hotel X and will, therefore, improve the performance and the degree of treatment provided by the property's septic tanks and French drains.

E-5 Promptly fix all leaks in faucets, toilets and pipes and ensure that all water-using fixtures are in proper working order.

The auditors found only few leaking faucets and creeping toilets while inspecting the property, suggesting that Hotel X has an effective maintenance program for its water-using fixtures. However, since even a single dripping tap can waste up to 10,000 IG/year (58 US\$/year) and an overflowing toilet can easily lose 720 IG/day (4.17 US\$/day), Hotel X should persevere in its leak prevention efforts.

Maintaining Hotel X's water-using fixtures in proper working order requires an effective preventive

maintenance program and the collaboration of all employees. All staff members -- and in particular housekeepers -- should be trained to detect leaks and malfunctioning toilets (leaky flapper valves, sticking flush mechanism, overflowing toilet tanks), and to promptly report these problems. The maintenance staff should promptly answer maintenance requests and conduct an effective preventive maintenance program which includes the following operations:

- < Replace missing or damaged faucet aerators.
- < Ensure that there are no excessive leaks in the valves which divert water from the tub faucet to the shower head -- that is, only a minimum amount of water should come out of the tub faucet while the valve is on the Ashower@ position.
- < Ensure there are no excessive leaks around the handles of tub and sink faucets.
- < Periodically descale all shower heads. Clogged shower heads may encourage guests to take baths rather than showers -- a bath consumes 2 to 4 times more water than a shower.
- < Ensure that tub and sink stoppers seal properly. Repair damaged stopper mechanism and replace leaking stoppers.
- < Check for broken toilet flush mechanisms. A damaged or jammed flush mechanism can waste more than 5 IG/minute (7,200 IG/day) until it is detected and corrected.
- < Check for damaged and leaking toilet flapper valves.
- < Remove scale deposits in toilet tanks that obstruct the flapper valve.
- < Adjust the water level in toilet tanks to the minimum level required for proper operation. An excessively high water level in the toilet tank can waste up to 0.5 IG/flush; letting the water level rise above the top of the tank overflow pipe can result in a constant loss of water of more than 0.5 IG/min.

The cost of these maintenance operations is generally minimal.

E-6 Install aerators on all possible faucets.

Most faucets in Hotel X's guest, public and back-of-house areas are not equipped with flow aerators. The absence of these low-cost water-saving devices contributes to the excessive use of water at Hotel X.

Flow aerators screw directly at the end of faucets and reduce their output without affecting in most cases the Afeel@ of the flow. A standard aerator generally costs less than 2.00 US\$ while a tamper-proof model costs less than 3.00 US\$. The rated outputs and the recommended application of the standard aerator models available on the market are given in the following table.

Rated output	Recommended application
0.4 IG/min (0.5 USG/min)	<ul style="list-style-type: none"> < Public bathrooms < Employee bathrooms < Hand-wash stations

1.3 IG/min (1.5 USG/min)	< Guest bathrooms < Public bathrooms < Employee bathrooms < Hand-wash stations
1.7 IG/min (2.0 USG/min)	< Guest bathrooms < Public bathrooms
1.8 IG/min (2.2 USG/min)	< Work area faucets in kitchens, bars, laundry, etc.
2.1 IG/min (2.5 USG/min)	< Work area faucets in kitchens, bars, laundry, etc.
Note: The rated output of aerators is for a line pressure of 60 to 80 psi. In most instances, the actual output of an aerator is well below its rated output.	

The use of flow aerators is particularly important on faucets that are used frequently (e.g., public and employee restrooms), are left running for long periods of time (e.g., kitchen, laundry room), or have exceedingly high outputs. Flow aerators also save energy by reducing the amount of hot water drawn from faucets.

Hotel X should install:

- < 0.5 or 1.5 USG/min aerators in public and employee bathroom faucets;
- < 1.5 USG/min aerators in the guest bathroom faucets;
- < 2.2 or 2.5 USG/min aerators in all villa kitchen faucets;
- < 2.2 or 2.5 USG/min aerators in all main kitchen faucets.

The costs and savings associated with the installation of aerators in some specific hotel areas are presented in the following calculations.

E-7 Install 2.2 (or 2.5) USG/min aerators on all villa kitchen faucets.

Financial savings	= 758 US\$/year	Water savings	= 73,200 IG/year
Implementation cost	= 55 US\$	Electricity savings	= 2,400 kWh/year
Payback period	= 0.9 month		

None of the inspected villa kitchen faucets were equipped with aerators. The output of these faucets ranges up to 4.2 IG/min, but could easily be reduced to less than 1.8 IG/min with flow aerators.

E-8 Install 1.5 USG/min aerators in all guest bathrooms.

Financial savings	= 212 US\$/year	Water savings	= 35,600 IG/year
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Implementation cost	= 117 US\$	
Payback period	= 7 months	

Only 15% of the sink faucets in the inspected guest bathrooms were equipped with working aerators.

E-9 Reduce the maximum output of hose bibs in the laundry room and other areas by installing flow restrictors on the water lines.

A flow restrictor is a small washer or tube that fits on the water pipe leading to the hose bib (or any other water using fixture) and the restricts the output of the pipe generally to less than 2.1 IG/min. The cost of a flow restrictor ranges from 0.25 to 1.00 US\$. These water conservation devices require periodic maintenance and should therefore be used only on fixtures that cannot accommodate aerators.

E-10 Periodically clean and descale all faucet aerators.

Aerators should be periodically cleaned and descaled by soaking them overnight in vinegar (1.40 US\$/liter) or another safe descaling product. Clogged aerators are often dismantled or broken by frustrated guests and employees.

E-11 Use the shut-off valves to reduce high faucet flows.

In addition to flow aerators, the high output of faucets can be further controlled by adjusting the shut-off valves located on the pipes that bring water to the faucets. In many cases, these valves are wide open and thus subject the faucets to the full pressure carried by the water distribution system. These valves should be adjusted to reduce the water pressure acting on the faucets and thereby reduce the maximum flow output of the faucets.

Hotel X should use this technique to limit the output of its older faucets (e.g., in the employee bathrooms) which cannot accommodate flow aerators and which cannot be economically replaced with new faucets.

E-12 Ensure that guest bathroom sinks are equipped with stoppers which seal properly.

The lack of properly fitting stoppers forces guests to use running faucets when shaving, washing clothes, etc. Only 40% of the inspected guest room sinks were equipped with functional stoppers.

E-13 Ensure that guest bathroom tubs are equipped with stoppers which seal properly.

Poorly fitting or leaking stoppers force guests to use more water whenever they take baths. Only 65% of the inspected guest room tubs were equipped with functioning stoppers.

E-14 Install low-flow shower heads in all guest bathrooms.

Financial savings	= 6,970 US\$/year	Water savings	= 339,000 IG/year
Implementation cost	= 440 US\$	Electricity savings	= 37,300 kWh/year
Payback period	= 0.8 month		

65% of the inspected guest bathrooms were not equipped with low-flow shower heads, and these inefficient shower heads used from 3.2 to 5.0 IG/min. A high quality low-flow shower head uses less than 2.1 IG/min and costs approximately 15.00 US\$.

Before purchasing low-flow shower heads, Hotel X should find out from local hoteliers which brands of low-flow shower heads have a proven performance record in Country X.

E-15 Install tamper-proof low-flow shower heads in all staff bathrooms.

Financial savings	= 440 US\$/year	Water savings	= 74,000 IG/year
Implementation cost	= 61 US\$		
Payback period	= 1.6 months		

None of the property's staff bathrooms are equipped with effective low-flow shower heads.

E-16 Periodically clean the scale which clogs the shower heads.

Scale deposits severely affect the quality of the shower flow and may encourage guests to take baths instead of unpleasant showers. Since baths consume 2 to 4 times more water than showers, Hotel X should ensure all shower heads work properly.

The shower heads should be cleaned by scraping all the possible scale and soaking them overnight in vinegar or another safe descaling product. If after removing the scale the existing shower heads produce an excessively high flow, Hotel X should replace them with low-flow shower heads.

E-17 Retrofit the existing conventional toilets with toilet dams, displacement devices or early-closure devices.

Financial savings	= 92 US\$/year	Water savings	= 15,300 IG/year
Implementation cost	= 92 US\$		
Payback period	= 12 months		

These water conservation devices are designed for conventional toilets (i.e., toilets equipped with large water tanks and which use between 3.3 to 4.2 IG per flush) and can reduce by 0.4 to 1.0 IG the amount of water used for each flush.

- < Displacement devices are objects, such as bags or containers filled with water and pebbles, that are placed in the water tanks of conventional toilets to reduce the volume, but not the height, of the water stored in the tanks. Displacement devices must be compatible with the existing toilets and not interfere with the flush mechanisms, and should be anchored (attached to the tank wall) to prevent them from migrating inside the tank. Home-made displacement devices can be made by filling a plastic bottle or container with water and pebbles.
- < Toilet dams are flexible metal panels that are used to block off part of the water tank of conventional toilets and thus reduce the volume of water that drains to the bowl with each flush.
- < An early-closure device replaces the existing flush valve or acts on the existing flush valve forcing it to close early and thereby saving water. There are a large variety of early closure devices currently available on the market.

Note that water conservation devices cannot be automatically installed on all of the property's conventional toilets. Hotel X's maintenance staff will have to determine by trial and error which devices can be installed on the property's conventional toilets. The auditors estimate that approximately 50% of the property's toilets could be fitted with water conservation devices.

E-18 Install flow diverters in the water tanks of all toilets which have an excessively long toilet bowl refill cycle.

Financial savings	= 72 US\$/year	Water savings	= 12,200 IG/year
Implementation cost	= 72 US\$		
Payback period	= 12 months		

Flow diverters fit at the end of the hose which feeds water to the toilet bowl's refill pipe, and divert to the water tank part of the flow that would otherwise drain to the toilet bowl. Flow diverters can therefore be used to

- 1) regulate the amount of water sent to refill the toilet bowl;
- 2) set a suitable water level in the toilet bowl (very often the water level in the toilet bowl is

- unnecessarily high); and
- 3) avoid overfilling the toilet bowl (once the water reaches the maximum allowable level in the bowl, all additional water added to the bowl is automatically discharged from the toilet).

Flow diverters can be easily installed on most conventional toilets and can save from 0.4 to 0.8 IG per flush. The cost of these water-conservation devices ranges from 1.00 to 3.00 US\$.

60% of the toilets inspected by the auditors had long toilet bowl refill cycles and could therefore be fitted with flow diverters.

E-19 Periodically check all toilets for leaking flapper valves and damaged flush mechanisms, and adjust the water level in the toilet tanks.

- < Ensure that the flapper valves seal properly. Clean or replace them as necessary.
 - < Adjust float valves to achieve a consistent and reasonable water depth in all toilet tanks, and periodically check the toilet tanks to ensure that the water depth is at the predetermined height. If the water level is too high, the toilet will use too much water with each flush or it may constantly lose water through the top of the overflow pipe. If the water level is too low, the toilet will not function properly and may have to be flushed more than once.
 - < Ensure that the flush valve mechanisms operate properly. A damaged or jammed flush mechanism can waste up to 5.0 IG/min until it is detected and corrected.
- C 5% of the inspected toilets had leaking flapper valves.
 - C 15% of the inspected toilets had excessively high water levels.
 - C 10% of the inspected toilets were overflowing.

E-20 Consider replacing conventional toilets with water-saving toilets in frequently used public or employee bathrooms.

- < All toilets in public and employee bathrooms are conventional toilets which are equipped with large water tanks and use from 3.3 to 4.5 IG per flush. Water-saving toilets are equipped with smaller tanks and are designed to use 1.3 IG per flush. A water saving toilets cost approximately 80 to 100 US\$.

Before implementing this recommendation, Hotel X should find out from local hoteliers which brands of water-saving toilets have a proven performance record in Country X.

- < Make sure that any water-saving toilet purchased by the property is installed in a frequently used

public or employee toilet rather than in a guest villa.

E-21 Reduce the need to power wash and the damage caused by excess rainfall.

Consider the following suggestions.

- < Gutter the terrace of the main building to eliminate the constant dripping of rainwater from the roof onto the awnings and sidewalk.
- < Apply a mildew-resistant sealer to all sidewalks and stepping stones to resist mildew growth.
- < Use mildew-resistant paint on all building exteriors.

E-22 Harvest rainwater and use it to supply the property's laundry and other operation that do not require potable water.

Financial savings	= 3,220 US\$/year	Water savings	= 541,000 IG/year
Implementation cost	= 2,780 US\$/year		
Payback period	= 10 months		

Rainwater is free, plentiful in City X, chemically pure and relatively clean: it is therefore an ideal source of water for the laundry and other operations that do not require potable water. Some of the principal benefits of rainwater harvesting are discussed below.

1. Since rainwater is naturally soft and has a very low concentration of total dissolved solids (TDS), it is one of the highest quality water naturally available. Because of its chemical purity, using rainwater in laundry operations will significantly reduce the consumption of detergents and other laundry chemicals. For example, ECOLAB technicians reported that a 1 grain/gallon (i.e., 17 mg/liter) reduction in the hardness of the wash water could reduce the consumption of detergent by up to 2 oz/100 lb of linen. Since Hotel X currently washes its laundry with hard tap water and does not use any water softening chemicals, the use of rainwater as wash water will significantly reduce this property's consumption of laundry chemicals.

Comparison between rainwater and tap water		
Parameter	Rainwater	Typical tap water
Hardness	< 10 mg/liter	200 - 300 mg/liter
TDS	< 50 mg/liter	300 - 600 mg/liter

pH	5.5	7.0
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2. Since rainwater is naturally soft it will not produce any scale in the property's water lines and water heaters.
3. Rainwater harvesting will reduce the amount of rainwater that is discharge to the ground during storms. This will reduce the water logging problems visible in some parts of the property and will keep the foundations of buildings drier, thereby preserving their structural integrity.

Energy - general issues**E-23 Eliminate excessive lighting levels in public and garden areas. Reduce garden and public area nighttime illumination in areas where there is no guest activity.**

Financial savings	= 1,000 US\$/year	Electricity savings	= 7,560 kWh/year
Implementation cost	= negligible		
Payback period	= immediate		

Note The figures shown in the preceding table represent the savings achieved by switching off the floodlights after midnight and taking out of service the two old incandescent garden walkway lights.

- < Hotel X should replace the existing light bulbs with weaker light bulbs in all excessively lit areas. Hotel X could even consider permanently deactivating some light fixtures in these areas.
- < Hotel X should reduce its lighting costs by switching off after midnight all unnecessary lights, such as the garden flood lights and some of the pool lights. Only the walkway lights and other key security lights should be left on when there is no guest activity.

In order to maximize the number of lights that can be turned off at nighttime, Hotel X may have to install new or reconfigure some of the existing circuits of its garden and public area lights.

E-24 Replace incandescent bulbs with compact fluorescent bulbs in gardens and public areas.

Financial savings	= 1,550 US\$/year	Electricity savings	= 13,500 kWh/year
Implementation cost	= 1,070 US\$		
Payback period	= 8 months		

Hotel X can reduce its lighting costs by replacing incandescent bulbs with compact fluorescent (CF) bulbs in public area and garden lighting fixtures. CF bulbs consume less energy than incandescent bulbs to produce the same amount of light, and also last up to 13 times longer than incandescent bulbs. Therefore, although CF bulbs cost more than incandescent bulbs, they save electricity and money in the long run.

Although it is often economically beneficial to use CF bulbs instead of incandescent bulbs, this property should first focus on replacing the incandescent bulbs that have a medium to high wattage (60 W to 100 W) and those that burn for long periods of time (8 hours per day) -- these fixtures offer the greatest potential savings and shortest payback periods.

The following tables show the financial savings and the payback periods for replacing incandescent bulbs with CF bulbs in light fixtures that are operated for 6 to 12 hours per day. These tables also show the equivalence in terms of light output between CF and incandescent bulbs, and should be used by Hotel X to decide which of its incandescent bulbs could be replaced with CF bulbs.

Payback period for replacing an incandescent bulb with a CF bulb				
Incandescent bulb	100W	75W	60W	40W
CF replacement bulb	27W	20W	15W	11W
Time of operation of the bulb	Payback period (in months)			
12 hours/day	7	9	11	20
10 hours/day	8	11	14	24
8 hours/day	10	14	17	30
6 hours/day	13	18	23	40

Financial savings achieved by replacing an incandescent bulb with a CF bulb				
Incandescent bulb	100W	75W	60W	40W
CF replacement bulb	27W	20W	15W	11W
Time of operation of the bulb	Savings (US\$/year)			
12 hours/day	38	28	22	12.5
10 hours/day	31.8	23.1	18.2	10.5
8 hours/day	25.4	18.4	14.6	8.4
6 hours/day	19.1	13.8	10.9	6.3

Before purchasing new compact fluorescent systems, Hotel X should consider the following issues:

- < Find out from local hoteliers, or other reliable sources, which types and brands of CF bulbs perform well in Country X.
- < Give preference to hard-wired systems over screw-in systems. Hard-wired systems are harder to dismantle and therefore reduce theft problems.
- < Give preference to CF systems that have separate ballasts and light bulbs. These systems have slightly higher initial costs but lower life cycle costs because the ballasts can be reused up to 4 times.
- < Give preference to CF systems that are equipped with electronic ballasts. Electronic ballasts have higher initial costs but prolong the life of the bulbs by partly compensating for low power quality. In addition, electronic ballasts do not generate noise.

- < Give preference to CF bulbs that have a color temperature of 2700K (i.e., bulbs that produce a warm and pleasant light).
- < Use CF bulbs that have a color temperature of 4100K to illuminate plants in the property's gardens. These bulbs render the green color much better than the 2700K CF bulbs.

E-25 Replace incandescent bulbs with compact fluorescent bulbs in guest rooms.

Hotel X can also conserve energy by replacing some of the guest room incandescent bulbs with CF bulbs. Since most of the energy used by incandescent light bulbs is transformed into heat, changing incandescent to CF bulbs in guest rooms will reduce the property's lighting and air-conditioning costs.

However, since the installation of compact fluorescent bulbs in guest rooms has a relatively long payback period, Hotel X should implement this recommendations 1) only after retrofitting its public area and garden lights with compact fluorescent bulbs, and 2) only in rooms that have an average occupancy greater than 75%.

Hotel X can use the tables given in the preceding recommendation to determine which of its guest room incandescent bulbs should first be replaced with CF bulbs.

E-26 Develop guidelines to define the bulb wattage that must be used in the property's light fixtures.

Currently the replacement of light bulbs in the property's light fixtures is often inconsistent. When a bulb burns out, it is often replaced with a new bulb that has a wattage rating that is different from that of the original bulb. This practice either leads to guest dissatisfaction, since lower wattage bulbs generate less light, or wastes energy. For example, replacing a single 60 W bulb with a 100 W bulb in a public area light fixture increases the property's energy costs by 24 US\$/year (calculation based on 12 hours/day and 0.13 US\$/kWh).

In order to ensure consistency and optimal lighting levels, Hotel X should develop written guidelines that specify the type of bulb that should be installed in each type of fixture. Alternatively, Hotel X could install stickers on the light fixtures to indicate the recommended bulb wattage. Since compact fluorescent bulbs have a lower wattage rating than incandescent bulbs of identical lighting output, the guidelines or stickers should specify the bulb wattage ratings for both technologies

E-27 Periodically clean the property's light fixtures and, if necessary, light bulbs.

Hotel X should regularly clean light fixtures and bulbs around the property to ensure that they perform

at maximum efficiency. The audit team found many dirty fixtures around the property.

The dust and dirt that accumulates on light fixtures and bulbs can often absorb up to 35% of the light generated and therefore waste much of the energy consumed. For example, a 40-watt light bulb in a clean fixture produces as much light as a 60-watt bulb in a dirty fixture and saves 2.00 US\$ worth of electricity over the life of the bulb.

Cleaning light fixtures should be part of the hotel's preventive maintenance checklist.

Energy - air-conditioning and refrigeration

E-28 Encourage guest to use natural ventilation rather than air-conditioning in guest rooms.

Financial savings	= 1,510 US\$/year	Electricity savings	= 11,400 kWh/year
Implementation cost	= not determined		
Payback period	= not determined		

The use of natural ventilation instead of air-conditioning in guest rooms could substantially reduce Hotel X's energy costs. In order to encourage guests to use natural ventilation, Hotel X's guest rooms should be equipped with:

- < effective and silent ceiling fans;
- < louvers or windows that can be operated easily;
- < window screens (Hotel X is ideally suited to install sliding window screens in the guest bedrooms).

The auditors noted the following shortcomings in Hotel X's guest rooms:

- < some ceiling fans were excessively noisy;
- < some of the ceiling fans had no speed controls;
- < the windows and louvers were not fitted with screens.

E-29 Minimize infiltration of hot air in guest rooms through louvers and doors.

Financial savings	= 1,000 US\$/year	Electricity savings	= 7,600 kWh/year
Implementation cost	= 500 US\$		
Payback period	= 6 months		

Note: The figures shown in the preceding table represent the energy savings achieved only by closing

three sides of the vented skylights in guest bathrooms.

Reduce the heat gain in air-conditioned guest rooms by implementing the following measures.

- < When applicable, install durable weather stripping to seal large air gaps around doors and windows, and between louver panes.
- < Repair the louvers where necessary.
- < Close three sides of the vented skylight in guest bathrooms.

In future refurbishing projects, Hotel X should consider replacing the louvers in air conditioned areas with French windows.

E-30 Clean the air filters of all air-conditioning units on a regular basis.

Many of the air-conditioning filters inspected by the auditors were clogged with dust and dirt. Air filters are thin foam pads or meshes that are fitted directly over the evaporator coils. They must be periodically cleaned (approximately once per month) in order to preserve an unobstructed flow of air to the evaporator coils and prevent the growth of fungi or other organisms in the accumulated dust. A clogged filter forces the fan motor to work harder, reduces the cooling capacity of the unit, increases its energy consumption by up to 6%, and may affect the air quality in the guest room. To clean an air filter:

- < remove the filter from the unit;
- < wash it with a mild detergent;
- < rinse it clean;
- < shake out excess water; and
- < air dry before re-inserting it into the air conditioning unit.

E-31 Periodically check all through-the-wall air-conditioning units to ensure that their exhaust vents are closed

An open exhaust vent lets fresh air enter the room and thus forces the a/c unit to work harder to keep the room cool. Since all of Hotel X's guest rooms receive plenty of fresh air through poorly sealing louvers and doors, the additional fresh air supplied by the exhaust vents is unnecessary and wasteful. Many of the air-conditioning units inspected during the audit were found to have open exhaust vents. Checking these vents should be part of the hotel's preventive maintenance checklist.

E-32 In the future, upgrade the type of a/c units purchased for guest rooms.

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Financial savings	= 1,510 US\$/year	Electricity savings	= 11,400 kWh/year
Implementation cost	= not determined		
Payback period	= not determined		

Consider the following options.

- < Purchase air conditioners that can be operated by remote control or whose control panels are not attached to the units. The control panels of the through-the-wall units that are currently installed on the ceiling of the second floor bedrooms are completely inaccessible. These units can only be turned on or off by activating a remote switch, and cannot be adjusted to maintain a desired fan speed or temperature. This situation may foster guest dissatisfaction and increases air-conditioning costs because some of the rooms are probably cooled more than necessary.
- < Purchase air conditioners that have a room temperature control system rather than the Acoil® temperature control system of the existing through-the-wall units. A room temperature control system allows the unit to maintain the desired temperature in the air conditioned space even if there are wide changes in temperature outside the room. In contrast, the existing a/c units provide excessive or insufficient cooling depending on the outside temperatures and conditions. As mentioned before, this situation may foster guest dissatisfaction and increases the property's air-conditioning costs.

It should be noted that improving the temperature control of air-conditioning units can save a significant amount of energy. In fact, increasing the desired temperature setting of an a/c unit by 4 to 6 F can reduce the energy consumption of the unit by approximately 15-20%.

Energy - hot water supply

E-33 Consider replacing the electric water heater in the guest rooms with LPG water heaters.

Financial savings	= 3,110 US\$/year	
Implementation cost	= not determined	
Payback period	= not determined	

Heating water with gas is 50% cheaper than heating water with electricity. Therefore, when the time comes to replace the existing water heaters in the villas, Hotel X should consider purchasing gas water heaters instead of electric water heaters.

Probably the most cost-effective configuration would be to replace several small electric water heaters with a large central gas heater which provides hot water to a few villas through a hot water recirculation

loop.

Hotel X should obtain from a local contractor a cost estimate for this conversion of electric to gas heaters.

Solid waste

E-34 Install paper towel holders in public bathrooms to reduce the chances of a roll getting wet and no longer fit for use.

Chemicals and hazardous products

E-35 Discontinue the routine use of enzymes in the drains of the villa kitchen sinks.

Instead of using enzymes to keep the kitchen drains clear, Hotel X should encourage all housekeepers to scrape greasy pots and pans into the garbage before washing them, and avoid dumping grease and oil down the kitchen drains. Also, Hotel X should ensure that all kitchen sink are equipped with strainers to prevent clogging the drain pipes with particles of food and other wastes.

E-36 Minimize the use of drain cleaning chemicals.

The hotel should avoid the use of drain cleaning chemicals whenever possible. Drain cleaning chemicals are toxic, hazardous, and expensive, and should therefore be used sparingly and only as a last resort. Furthermore, these chemicals harm the bacteria that decompose and purify the wastewater in the property's septic tanks and French drains. The destruction of these beneficial bacteria increases the rate at which solids accumulate in septic tanks, increases the possibility of clogging the French drains, and increases the mass of pollutants which reach the ground water table.

The maintenance staff should therefore first try to clear clogged drains with a plunger and a Snake® before using chemicals. Snakes are long, highly-flexible metal wires or coils that are very effective in clearing clogged drains; they can be operated manually or powered with a drill-like device. Most snakes coil directly into a small canister and can therefore be conveniently stored, carried, and used. The cost of these tools ranges from 20 \$US for a manual snake to 250 \$US for a top-of-the-line power-driven snake.

Drain cleaning chemicals should never be used for the preventive maintenance of drains.

4.3. Housekeeping and guest rooms

General issues

H-1 Create a checklist for housekeepers

Create a checklist, or personal action plan, for housekeepers to ensure they are aware of and comply with the conservation measures adopted by Hotel X. Examples of items that should be included in this checklist are given below.

- < Turn the a/c off when preparing an unoccupied guest room.
- < Before leaving an unoccupied guest room or villa:
 - C turn off all lights;
 - C ensure that faucets and toilets are not running.
- < Check for and report malfunctioning equipment and fixtures. Pay particular attention to:
 - C creeping toilets,
 - C sticking toilet flush handles or malfunctioning flush mechanisms;
 - C leaking faucets and shower heads;
 - C excessively high flows from faucets or shower heads;
 - C clogged aerators or shower heads;
 - C scalding hot water;
 - C sink and bathtub stoppers that don't seal properly;
 - C damaged windows or louvers;
 - C malfunctioning air conditioners;
 - C missing strainers in the kitchen sink drains;
 - C excessive frost build-up in refrigerators;
 - C gas leaks in the kitchen stove/range.
- < Remove used soaps only at checkout. The used guest room soaps can be used to mop floors, wash employee uniforms.
- < Avoid discarding fat and oil down the kitchen drain.

Even though many housekeepers already practice some of these measures, this checklist will allow management to establish clear housekeeping policies and ensure that housekeepers know exactly what is expected of them.

The hotel should also standardize its turn-down procedures so that all housekeepers responsible for providing turn-down service will know which lights should be left on, that fans should be turned off, that air conditioners should be turned off, etc. The auditors found that housekeepers are inconsistent in

their turn-down procedures, especially concerning the number of lights left on. Once standard procedures are established, the hotel management should periodically remind housekeepers of these policies and perform periodic spot checks to ensure compliance.

Water, energy and chemicals

H-2 Start a linen and towel reuse program

The property should consider implementing a towel and linen reuse program which encourages its guests to reuse their towels and linen more than once. International experience shows that this measure can reduce the laundry load by up to 40%. By reducing the amount of material processed through its laundry, Hotel X will be able to lower its water, chemicals and energy consumption and costs, reduce the wear and tear on its linen and towels, and increase the service life of its laundry equipment.

Hotel X should however implement this type of program only after other visible environmental initiatives are firmly established. The guests' reaction to a towel and linen reuse program is typically more positive if they can see that the hotel is truly concerned about the environment. They do not want to feel like they are making all of the sacrifices or that the hotel is simply trying to save money.

Towel reuse program

The towel reuse portion of this program is straightforward: guests are asked to leave their towels hanging up if they wish to use them again or put them on the floor (or in the tub or in a basket) if they would like to have them replaced. The principal concern with a towel reuse program is to ensure that housekeepers comply with the guests' requests. In many cases, housekeepers routinely replace all bathroom towels, including those that are left hanging by the guests.

Linen reuse program

Since Hotel X changes the bed linens only every other day, the property should decide whether to implement a standard linen reuse program, as described below, or simply continue with the existing program.

A standard linen reuse program is designed in one of two ways:

- 1) The guest is asked to leave a card on the bed indicating that it is not necessary to change the sheets that day. This approach works but gets fairly low guest participation, since even environmentally concerned guests often forget to leave the card in the correct place.
- 2) The guest is informed that, in an effort to protect the environment, the hotel only changes sheets

every two or three days. If the guest would like to have the sheets changed more frequently, the guest is asked to place a card on the bed to have them changed that day. This method puts the burden on the guest and, therefore, results in considerably higher participation.

Once the hotel is ready to begin this program, it should purchase attractive, colorful in-room materials to communicate the program to the guest. These materials are available through a variety of sources, including the Caribbean Hotel Association. The CHA cards offer two key advantages over some of the other cards on the market:

- < The design of the CHA materials will capture the guests' attention better than most other cards. It is important that the guests be clearly told about the program so that they feel that they have been given the opportunity to make a choice. The program is not designed to trick the guest into participating, but that is how they will feel if the program is not properly communicated.
- < The CHA materials state that it is the hotel's policy to change sheets every three days unless the guest requests that they be changed more often. As indicated above, this approach results in the greatest savings.

The success of the towel and linen programs relies on the effective participation of the property's housekeepers. If this program is implemented, all housekeepers should be thoroughly trained to ensure they clearly understand their role and responsibilities.

As discussed below, programming and scheduling the linen changes can be accomplished in several ways.

- < Designate certain days as sheet changing days.® With this approach, all guest room linens are changed on fixed days of the week (for example, every Tuesday and Friday) instead of every three days. Assigning fixed sheet changing days® allows the property to easily increase housekeeping and laundry staff to handle the additional workload on those days, and avoids confusing housekeepers. On the other days of the week, housekeepers only change sheets in checkout rooms and where requested by the guests.
- < Count off every three days and post a notice to inform housekeepers which days are sheet changing days.® This approach ensures that sheets are changed on the exact schedule noted on the in-room materials, and still makes it relatively easy for housekeepers to know when to change the sheets. As mentioned before, on the other days of the week, housekeepers only change sheets in checkout rooms and where requested by the guests.
- < Keep track of each guest room and change the sheets only after it has been occupied for three consecutive days. However, many properties find it difficult to use this approach since it requires a complex information, tracking and communication system. If applicable, this approach yields the greatest savings since it ensures that guest room linens are not changed more often than specified

by the program.

Each property will have to select one of these approaches and modify it as needed to incorporate it in its housekeeping and laundry operations.

Two other issues are key to the success of the linen reuse program:

- < Housekeepers should replace soiled linens even when guests have not requested a change of sheets. A bed should never be made with dirty linens.
- < If a guest checks out early on a day when sheets were not changed, it is important that someone be assigned to change the sheets before a new guest checks in. One way to know for sure if the sheets were changed is to leave the bedspread in a turn-down type of configuration whenever used sheets are left on the bed. If the bed is completely remade, it will look just like a bed with fresh sheets, but leaving the bedspread partly turned back will allow anyone entering the room to know that the sheets have been used.

H-3 Store the bedspread in the guest room closet rather than placing it on the bed after the guest=s first night.

Many hotels have adopted this practice in order to reduce the need to frequently wash the bedspreads (thereby saving water, energy, chemicals and labor) and also minimize the wear and tear on these items.

Energy

H-4 Reduce the time of operation of air-conditioning units in guest rooms.

Many guests leave the air conditioner running and lights on after leaving their rooms. Hotel X should place a tactful note in the rooms to encourage guests to turn off air conditioners and lights whenever they leave their rooms for extended periods. Attractive energy and water conservation signs can be readily purchased from the CHA or other similar organizations.

Other actions that can be taken by Hotel X to reduce the energy consumed by its a/c units include:

- < When preparing a guest room, housekeepers should turn the a/c units off or, if this is unacceptable to the guests, adjust the a/c thermostat to a Allow cool and low fan@ setting.
- < Keep the rooms cooler by closing curtains of windows that are exposed to direct sunlight.
- < If the room is cool or if the air-conditioner is on, ask housekeepers to keep the guest room door closed during guest room preparation. This practice will keep the room cooler and prevent insects (especially mosquitoes) from entering the room. If the door must be left open during guest room preparation, ask housekeepers to turn off the a/c units.

H-5 Unplug the refrigerators in unoccupied villas.

The refrigerators should be shut off or unplugged in all rooms that remain unoccupied for more than a week. This practice will save energy and lengthen the service life villas= refrigerators.

At the present time, the villa refrigerators are left running year-round.

Solid waste

H-6 Do not provide a new roll of toilet paper at check-in unless the used roll is nearly empty.

Housekeepers should leave partially-used rolls of toilet paper in guest bathrooms for the next guest instead of providing each new guest with a brand new roll. Unless the roll is nearly empty, the first square of the used roll of toilet paper can be folded attractively for the next guest. Once a roll is less than half full, a spare roll should be placed on the lid of the toilet tank.

Chemicals and hazardous products**H-7 Use a dispensing system to dilute and safely transfer bulk chemical to the containers used by housekeepers.**

The hotel should consider purchasing its housekeeping chemicals from a company that offers a dispensing system for bulk products. Currently, many of the property's chemicals are purchased in bulk but are not diluted with water and are poured by hand into the housekeepers' individual containers. Using these products at full concentration wastes money, and pouring by hand offers the opportunity for spillage. A good quality dispensing system automatically dilutes each product as it transfers the chemical into the individual containers used by the housekeepers.

H-8 Minimize the use of harsh chemicals such as bleach.

Milder cleaning products are safer for the housekeepers and do not affect the performance of the property's septic tanks and French drains. Home-made cleaning products are often cheaper than the commercial equivalents.

For example, Hotel X could eliminate the use of bleach in the villas by replacing it with the mixture of vinegar and baking soda that is currently used by some housekeepers.

H-9 Ensure that all housekeeping chemicals are properly stored, handled and labeled.

- < Most of the bulk products are first poured into smaller containers that are easier to handle before they are transferred to the bottles used by the housekeepers. Unfortunately, these containers do not have lids and are not labeled. Until the property obtains a dispensing system, all chemical containers should be covered to reduce the likelihood of a spill, and labeled to eliminate confusion which could lead to the possible misuse of the housekeeping chemicals.
- < Housekeeping chemicals should only be poured into suitable and properly labeled containers. Hotel X's housekeepers often store their chemicals in old drink bottles which are not properly capped and labeled.
- < The housekeeping chemicals that are stored in the villas should be placed in an area that is out of reach of young children. Currently, the housekeeping chemicals are stored in the counters located under the villas' kitchen sinks.

H-10 Minimize or eliminate the use of Bay-Gon

The hotel should identify less-toxic alternatives to Bay-Gon for killing insects. Bay-Gon contains hazardous chemicals that have been banned in the United States. It is also an aerosol, which means that it probably contains propellants gases which harm the environment by contributing to the green house effect. For example, many properties use borax powder to eliminate roaches.

4.4. Laundry

General issues

L-1 Create an operations checklist for the laundry staff

The hotel should create a checklist, or personal action plan, for the laundry staff to ensure that they are aware of and comply with the conservation measures adopted by Hotel X. Examples of items that should be included in this list are given below.

- < Wash and dry only full loads. Any partial loads remaining at the end of the day should be left to wash with additional items the following day. Staff uniforms should either be line-dried or dried together in the dryer (not one at a time). Cloth napkins should be collected from each villa in the morning, washed as on load, and then returned to the villas - in one instance, the auditors found only four napkins in the dryer.
- < Pre-soak all items that are heavily-soiled to prevent re-washing.
- < Sort sheets and towels into separate loads, since each requires a different amount of detergent and a different drying time.
- < Set the drying time based on the type of load instead of always selecting the maximum drying time.
- < Clean the lint trap at least once per day.
- < Use a measuring cup to ensure that only the right amount of chemical is used to process each laundry load.

Once these procedures are established, management should perform periodic spot checks to ensure compliance.

Chemicals and hazardous products

L-2 Identify environmentally friendly laundry chemicals

Since the detergents used in the laundry are sold in unlabeled bags, Hotel X should obtain the product description from the manufacturer and ensure that these detergents are phosphate-free. If the laundry chemicals currently used at Hotel X contain phosphates, the property should replace them with environmentally friendly substitutes.

4.5. Kitchen

Energy

K-1 Turn off or unplug any refrigerator or freezer that is not regularly used.

- < The auditors found two freezers that were on despite the fact that they were essentially empty. If the staff needs a place to store food items, they should use the refrigerator located in the employee eating area near the laundry.
- < In order to prevent odors, the door of the refrigerator or freezer should be left partly open after the units have been turned off.

K-2 Train the staff to turn the lights off in the kitchen.

The staff (especially the bartender) should be trained to turn lights off in the kitchen when this area is not in use, and management should consider posting reminder signs near the light switches to encourage the staff to do so. If this continues to be a problem, the property should consider installing wind-up lighting timers to control the lights in these problematic areas.

Appendix I

Detailed calculations of selected recommendations

Appendix II

Supporting information

Summary of Hotel X=s environmental aspects, impacts and EMS objectives

Type of environ. aspect of the hotel=s activities	Type of activities which have these environmental aspects	Environmental impact of the activities	Objective of the property=s EMS
WATER USE	<ul style="list-style-type: none"> - Use of guest room and public bathrooms - Laundry room and operations - Housekeeping and cleaning operations - Kitchen and bar operations - Garden upkeep 	<ul style="list-style-type: none"> - Inefficient use of a valuable resource 	<ul style="list-style-type: none"> - Reduce water consumption
ENERGY USE	<ul style="list-style-type: none"> - Operation of a/c units, water heaters, washing machines, dryers and pool pumps - Use of hot water and lighting 	<ul style="list-style-type: none"> - Inefficient use of valuable and non-renewable resources - Generates air pollution (mainly at the power plant), greenhouse gases, acid rain 	<ul style="list-style-type: none"> - Reduce energy consumption
SOLID WASTE GENERATION	<ul style="list-style-type: none"> - Office operations (paperwork) - Food purchasing, preparation and serving - Bar operations - Maintenance operations - Garden upkeep 	<ul style="list-style-type: none"> - Disposal of solid wastes in inadequate municipal dumps - Contamination of groundwater and surface water - Loss of raw materials 	<ul style="list-style-type: none"> - Reduce the amount of solid waste generated by the property
GENERATION OF WATER POLLUTANTS	<ul style="list-style-type: none"> - Laundry room operations (e.g., use of phosphate-based detergents) - General housekeeping and cleaning operations (excessive use of chemical cleaning and disinfecting products) - Food preparation (disposal of grease/oil) 	<ul style="list-style-type: none"> - Increases pollutant load discharged to the groundwater table and sea - Reduces the effectiveness of the wastewater disposal system 	<ul style="list-style-type: none"> - Reduce the pollutant load contained in the hotel=s effluent
USE OF HAZARDOUS PRODUCTS	<ul style="list-style-type: none"> - Laundry room operations (use of bleach, and acid or caustic cleaners) - General housekeeping and cleaning operations (use of bleach, toxic cleaning chemicals, insecticides) - Maintenance operations (e.g., drain clearing chemicals) - Grounds keeping (pesticides/insecticides) 	<ul style="list-style-type: none"> - Exposes guests and employees to hazardous products. 	<ul style="list-style-type: none"> - Reduce the number and amount of hazardous products used on the property
GENERATION OF AIR EMISSIONS	<ul style="list-style-type: none"> - Maintenance operations (e.g., release of CFC from air conditioning units, use of solvents) - General housekeeping and cleaning operations (use of aerosols) 	<ul style="list-style-type: none"> - Release of CFCs to the atmosphere - Exposes guests and employees to hazardous air pollutants 	<ul style="list-style-type: none"> - Phase out CFC refrigerants - Reduce the use of solvents, insecticides, pesticides
DAMAGE TO THE ECOSYSTEM	<ul style="list-style-type: none"> - Use of fertilizer, insecticides and pesticides in the gardens - Direct discharge of the laundry graywater on the ground 	<ul style="list-style-type: none"> - Damages the environment and ecosystem surrounding the property 	<ul style="list-style-type: none"> - Reduce the damage caused by the property=s operations on the ecosystem.

ACTION PLAN FORM

MAINTENANCE DEPARTMENT - WATER CONSERVATION ISSUES

Action	By whom	Target date	Actual date
Implement a leak detection and prevention program			
C Prepare a plan for carrying out a monthly inspection of the property's water distribution system, guest bathrooms, public restrooms, kitchen, bar, beach showers, and irrigation system.	Mr. X	12/1/97	
C Develop the checklist forms that will be used to track the preventive maintenance work conducted by this program.	Mr. X	1/1/98	
C Hold a training workshop to teach housekeeping staff on how to detect and report malfunctioning equipment and leaks. Prepare a summary of this information for inclusion in housekeeping staff's training manual.	Ms. Y	1/15/98	
C Begin the first round of inspections. Repeat the cycle of inspection each month.	Maint. staff	2/1/98 - onw	
C After each round of inspection, present summary of findings to general manager	Mr. X	3/1/98 - onw	
Install 1.6 US gallon/flush toilets in the beach-side public restrooms			
C Identify the type/brand of 1.6 US gal/flush toilets which have given satisfactory results in Country X. Get recommendations from maintenance staff of other hotels.	Mr. Z	2/1/98	
C Contact vendor and place order for 4 units.	Mr. W	3/1/98	
C Install the units.	Ms. Y	< 1 mth after receipt	
C Monitor weekly to ensure proper performance. Continue the weekly monitoring for two months following installation.	Mr. X	after installation	
Water consumption monitoring program			
C Prepare the forms that will be used to collect data from the property's 3 meters.	Mr. Z	12/1/97	
C Train all members of the maintenance staff on how to properly read the meters, enter the information on the forms, and calculate the property's weekly water consumption.	Mr. Z	12/15/97	
C Begin collecting the water consumption monitoring program.	Maint. staff	1/1/98 - onw	
C On the first day of each month, calculate the total water consumption and collect total guest night figures for the previous month. Calculate IG/GN value for the previous month. Provide the IG/GN figure to the Green Team.	Ms. Y	2/1/98 - onw	

Personal Action Plan - Housekeeping staff		
Action	By whom	Date
<p>Guest room preparation checklist</p> <p>C Turn off the air-conditioning unit when entering a guest room.</p> <p>C Do not replace the trash can liners (plastic bags) unless these are soiled or otherwise unacceptable for further use.</p> <p>C Report all malfunctioning equipment to the hotel operator -- contact the maintenance department directly only if the need for repair is urgent.</p> <p>Pay particular attention to water leaks in toilets, faucets and shower heads; excessively high flows from faucets or shower heads; sticking toilet flush handles; sink and bathtub stoppers which don't work or don't fit properly; damaged windows or louvers; scalding hot water; malfunctioning air conditioners.</p> <p>C Collect all recyclable items placed in the guest room green recycling containers. Recyclable item consist of:</p> <p>B clear, green, and amber glass bottles</p> <p>B plastic beverage bottles</p> <p>B aluminum beverage cans</p> <p>B metal cans</p> <p>B newspaper</p> <p>B white paper</p> <p>C At the end of your shift, place all collected recyclables in the appropriate recycling bins located by the laundry room.</p> <p>C Before leaving the guest room:</p> <p>B turn off all lights, televisions and radios;</p> <p>B leave the a/c unit off;</p> <p>B if the a/c is left on at the guest's request, make sure that all windows and louvers are properly closed;</p> <p>B ensure that faucets and toilets are not running.</p>	All house-keeping staff	Start on 12/01/97
<p>Towel and linen reuse program</p> <p>C</p> <p>C</p> <p>C</p>		

Water - Monitoring form				
Meter number:		Month and year:		Reading units:
Day	By	Meter reading	Consumption	Comments or corrective action
			¶ Insert here the last meter reading of the previous month	
1				
2				
3				
4				
5				
6				
7				
8				
9				
10				
11				
12				
13				
14				
15				
16				
17				
18				
19				
20				
21				
22				
23				
24				
25				
26				
27				
28				
29				
30				
31				
Total monthly consumption				

Number of guest nights for the month = _____

Water consumption index = (monthly water consumption) / (number of guest nights)
=

Example of a partially completed water monitoring form

Water - Monitoring form				
Meter number: 34,524,356		Month and year: December 1997		Reading units: Thousand imperial gallons
Day	By	Meter reading	Consumption	Comments or corrective action
		15,234.600	¶ Insert here the last meter reading of the previous month	
1	PGM	15,256.700	15,256.700 - 15,234.600 = 22.100	
2	PGM	15,278.300	15,278.300 - 15,256.700 = 21.600	
3	PGM	15,302.500	24.200	
4	PGM	15,322.200	19.700	
5	PGM	15,342.700	20.500	
etc ...				
25	PGM	15,768.700	21.800	
26	PGM	15,791.600	22.900	
27	PGM	15,880.900	89.300	Because of jump in water consumption, maintenance began inspection of water distribution system
28	PGM	15,976.400	95.500	Discovered leak in property's main distribution line. Leak was fixed at 10:30 PM.
29	PGM	16,006.200	29.800	
30	PGM	16,027.500	21.300	
31	PGM	16,050.300	22.800	
Total monthly consumption			16,050.300 - 15,234.600 = 815.700 thousand imperial gallons	

Number of guest nights for the month = 3,077 GN (obtained from front desk records)

Water consumption index = (815,700 Imperial gallons) / (3,077 GN)
= 265.1 Imperial gallons/GN

Electricity - Monitoring form				
Meter number:		Month and year:		Multiplier:
Day	By	Meter reading	Change in meter reading	Comments or corrective action
			¶ Insert here the last meter reading of the previous month	
1				
2				
3				
4				
5				
6				
7				
8				
9				
10				
11				
12				
13				
14				
15				
16				
17				
18				
19				
20				
21				
22				
23				
24				
25				
26				
27				
28				
29				
30				
31				
Total change in meter reading for the month				

Total monthly electricity consumption = total change in meter reading x multiplier
= _____ kWh

Number of guest nights for the month = _____

Electricity consumption index = (monthly elec. consumption) / (number of guest nights)
= _____